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NOMENCLATURE

Roman Symbols

A	-	Area	m^2
A_g	-	Glass window area	m^2
Bi	-	Biot number	-
cr	-	Common ratio	-
cry	-	Common ratio for Y response factors	-
crz	-	Common ratio for Z response factors	-
C	-	Specific heat	J/kg/K
CG	-	Conduction through glass window due to air-to-air temperature difference	W
CL	-	Total cooling load	W
CV	-	Control volume	-
d	-	Solar declination angle	degrees
d_n	-	Number of day of the year	-
e	-	Short wave radiant energy intensity	W/m^2
ER	-	Heat extraction rate	W
f	-	Radiative heat transfer coefficient	$W/m^2/^oC$
f_R	-	Radiative fraction of conduction heat gain	-
F_{ij}	-	Geometric view factor between surface i and j	-
Fo	-	Forier number	-
F_{sg}	-	View factor between a surface and the ground	-
F_{ss}	-	View factor between the surface and the sky	-
$F_{s\text{-}sur}$	-	View factor between the surface and the surroundings	-
FRADP	-	Radiative fraction of total sensible heat release from people	-

g	-	Air temperature weighting factor	-
h	-	Hour angle	degrees
hc	-	Convective heat transfer coefficient	($W/m^2/^oC$)
h_i	-	Combined radiative-convective inside surface heat transfer coefficient	$W/m^2/^oC$
h_o	-	Combined radiative-convective outside surface heat transfer coefficient	$W/m^2/^oC$
HG	-	Heat gain	W
IAD	-	Direct solar radiation absorbed by glass window	W/m^2
IAd	-	Diffuse solar radiation absorbed by glass window	W/m^2
I_d	-	Diffuse radiation from sky	W/m^2
I_r	-	Short wave radiation reflected from other surfaces and incident on a unit area of the surface	W/m^2
I_t	-	Total shortwave radiation incident on a surface	W/m^2
I_{dH}	-	Diffuse sky radiation incident on a horizontal surface	W/m^2
I_{DH}	-	Direct solar radiation on a horizontal surface	W/m^2
I_{DN}	-	Direct normal solar radiation	W/m^2
ITd	-	Diffuse component of transmitted solar radiation through a glass window	W/m^2
ITD	-	Direct component of transmitted solar radiation through a glass window	W/m^2
k	-	Thermal conductivity	W/m/K
l	-	Latitude of the location	degrees
L_e	-	Local longitude of Greenwich	degrees
L_s	-	Standard longitude of Greenwich	degrees
N_c	-	Compressor speed of AAC system	rpm
N_i	-	Fraction of absorbed solar radiation by glass window which flows into a thermal zone	-
p	-	Decay coefficient (associated with truncated air temperature weighting factors)	-
qcd	-	Conductive heat flux	W/m^2
qcv	-	Convective heat flux	W/m^2
qi	-	Inside surface heat flux	W/m^2

ql_p	-	Latent heat from people	W
qo	-	Outside surface heat flux	W/m^2
qr	-	Net long wave radiant energy exchange	W/m^2
qsc_p	-	Convective heat gain from people	W
qsr_p	-	Radiative sensible heat gain from people	W
qst_p	-	Instantaneous sensible heat release by people	W
$\dot{Q}_L$	-	Total coil latent load	W
$\dot{Q}_S$	-	Total coil sensible load	W
QZL	-	Zone latent load	W
r	-	Net cooling load response	-
r^2	-	Coefficient of determination	-
rh_3	-	Indoor relative humidity	%
R	-	Thermal resistance	$^oC/W$
SC	-	Shading coefficient	-
SHGa	-	Heat gain from the absorbed solar radiation through a glass window	W
SHGt	-	Heat gain from the transmitted solar radiation through a glass window	W
SLF	-	Fraction of sunlit window area at a given time of a day	-
t_a	-	Outdoor air dry-bulb temperature	^oC
t_{ci}	-	Condenser inlet air dry-bulb temperature	^oC
t_i	-	Inside surface temperature of a layer	^oC
t_o	-	Outside surface temperature of a layer	^oC
tr	-	Indoor dry-bulb temperature	^oC
t_1	-	Coil (evaporator) inlet air dry-bulb temperature	^oC
t_2	-	Coil (evaporator) outlet air dry-bulb temperature	^oC
t_3	-	Indoor dry-bulb temperature	^oC
T	-	Temperature	^oC
T_a	-	Outdoor air dry-bulb temperature	Kelvin
T_{sky}	-	Sky radiant temperature	Kelvin
$T_{sol\text{-}air}$	-	Sol-air temperature	^oC
T_{sur}	-	Temperature of surroundings objects, outside of a vehicle	Kelvin

TI	-	Inside surface temperature	^oC
TO	-	Outside surface temperature	^oC
TRC	-	Constant air temperature for computing cooling load	^oC
TSA	-	Supply air dry-bulb temperature	^oC
U	-	Overall heat transmission coefficient	$(W/m^2/^oC)$
U_g	-	U value for glass window	$(W/m^2/^oC)$
v	-	Heat gain weighting factor	-
v	-	Wind speed relative to the vehicle	m/s
$\dot{V}$	-	Air flow rate	L/s
V_c	-	Condenser air velocity	m/s
V_e	-	Evaporator air velocity	m/s
w	-	Decay coefficient	-
w_a	-	Outdoor air specific humidity	kg_v/kg_{da}
w_1	-	Coil (evaporator) inlet air specific humidity	kg_v/kg_{da}
w_2	-	Coil (evaporator) outlet air specific humidity	kg_v/kg_{da}
w_3	-	Indoor specific humidity	kg_v/kg_{da}
X	-	Heat conduction response factor	$(W/m^2/^oC)$
XOA	-	Ratio of air distribution system outdoor air intake to the design system air quantity	-
Y	-	Heat conduction response factor	$(W/m^2/^oC)$
Z	-	Heat conduction response factor	$(W/m^2/^oC)$

Greek Symbols

α	-	Thermal diffusivity	(m^2/s)
α_s	-	Surface absorptance for solar radiation	-
β	-	Solar altitude	degrees
$\boldsymbol{\varepsilon}$	-	Surface emissivity	-
$\boldsymbol{\varepsilon}$	-	Hemispherical emittance of the surface	-

ϕ	-	Solar azimuth angle	degrees
θ	-	Angle of incidence	degrees
$\boldsymbol{\rho}$	-	Density	kg/m^3
Σ	-	Tilt angle of the surface	degrees
ξ	-	Surface azimuth angle	degrees
$\boldsymbol{\omega}$	-	Harmonic frequency	radians/hour
Δt	-	Finite difference time step	s
Δx	-	Incremental slab thickness	m

Subscripts

a	-	air
da	-	dry air
m	-	nodal point
o	-	value at the previous time step
wv	-	water vapor

Abbreviations

AAC	-	Automotive air-conditioning
A/C	-	Air conditioning
ASHRAE	-	American Society of Heating, Refrigeration and Air-Conditioning Engineers
CAV	-	Constant air volume
CFD	-	Computational fluid dynamic
HBM	-	Heat balance method
HVAC	-	Heating, ventilating and air conditioning
PMV	-	Predictive mean value
rpm	-	Revolution per minute
RFM	-	Response factor method

TRFs	-	Thermal response factors
WFM	-	Weighting factor method
ZTFM	-	Z-transfer function method
ZTFcs	-	Z-transfer function coefficients

LIST OF APPENDICES